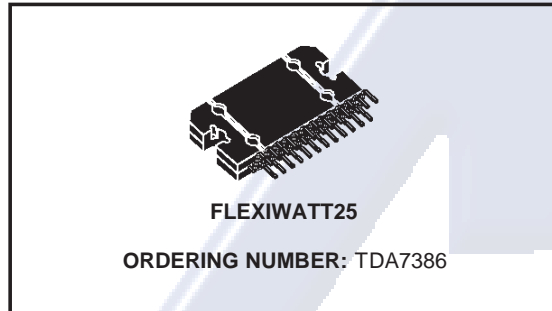




TDA7386

4 x 40W QUAD BRIDGE CAR RADIO AMPLIFIER

- HIGH OUTPUT POWER CAPABILITY:
 - 4 x 45W/4Ω MAX.
 - 4 x 40W/4Ω EIAJ
 - 4 x 28W/4Ω @ 14.4V, 1KHz, 10%
 - 4 x 24W/4Ω @ 13.2V, 1KHz, 10%
- LOW DISTORTION
- LOW OUTPUT NOISE
- ST-BY FUNCTION
- MUTE FUNCTION
- AUTOMUTE AT MIN. SUPPLY VOLTAGE DETECTION
- LOW EXTERNAL COMPONENT COUNT:
 - INTERNALLY FIXED GAIN (26dB)
 - NO EXTERNAL COMPENSATION
 - NO BOOTSTRAP CAPACITORS



- REVERSED BATTERY
- ESD

DESCRIPTION

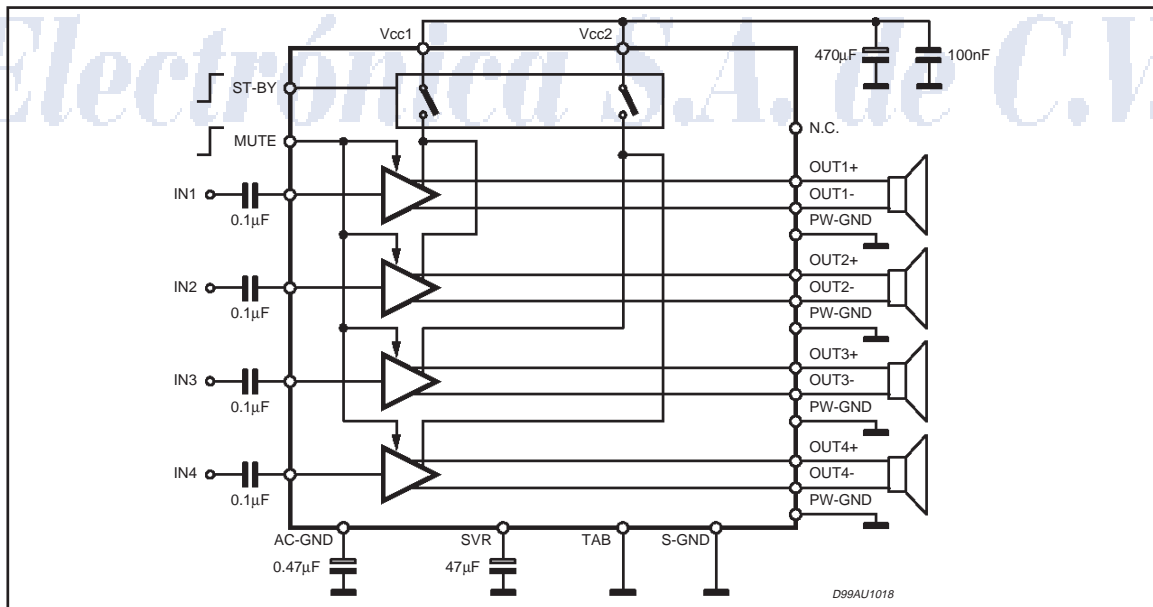
The TDA7386 is a new technology class AB Audio Power Amplifier in Flexiwatt 25 package designed for high end car radio applications.

Thanks to the fully complementary PNP/NPN output configuration the TDA7386 allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced components count allows very compact sets.

PROTECTIONS:

- OUTPUT SHORT CIRCUIT TO GND, TO Vs, ACROSS THE LOAD
- VERY INDUCTIVE LOADS
- OVERRATING CHIP TEMPERATURE WITH SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GND

BLOCK AND APPLICATION DIAGRAM

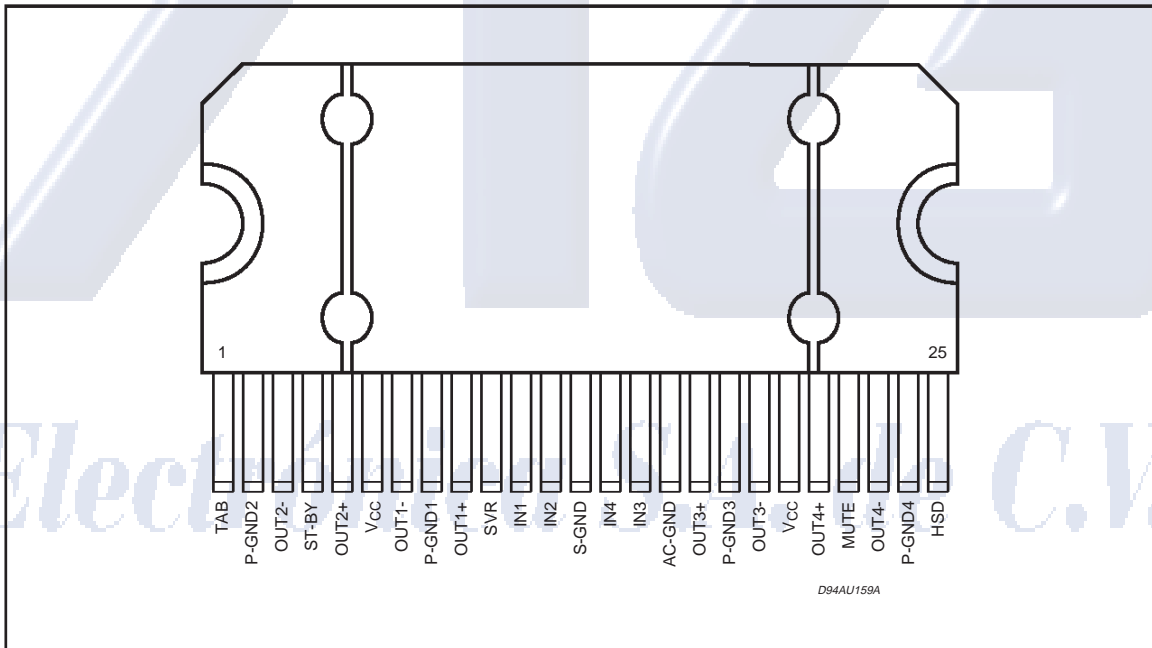


TDA7386

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Operating Supply Voltage	18	V
$V_{CC(DC)}$	DC Supply Voltage	28	V
$V_{CC(pk)}$	Peak Supply Voltage (t = 50ms)	50	V
I_o	Output Peak Current: Repetitive (Duty Cycle 10% at f = 10Hz)	4.5	A
	Non Repetitive (t = 100 μ s)	5.5	A
P_{tot}	Power dissipation, (T _{case} = 70°C)	80	W
T_j	Junction Temperature	150	°C
T_{stg}	Storage Temperature	- 55 to 150	°C

PIN CONNECTION (Top view)



THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction to Case	Max. 1	°C/W

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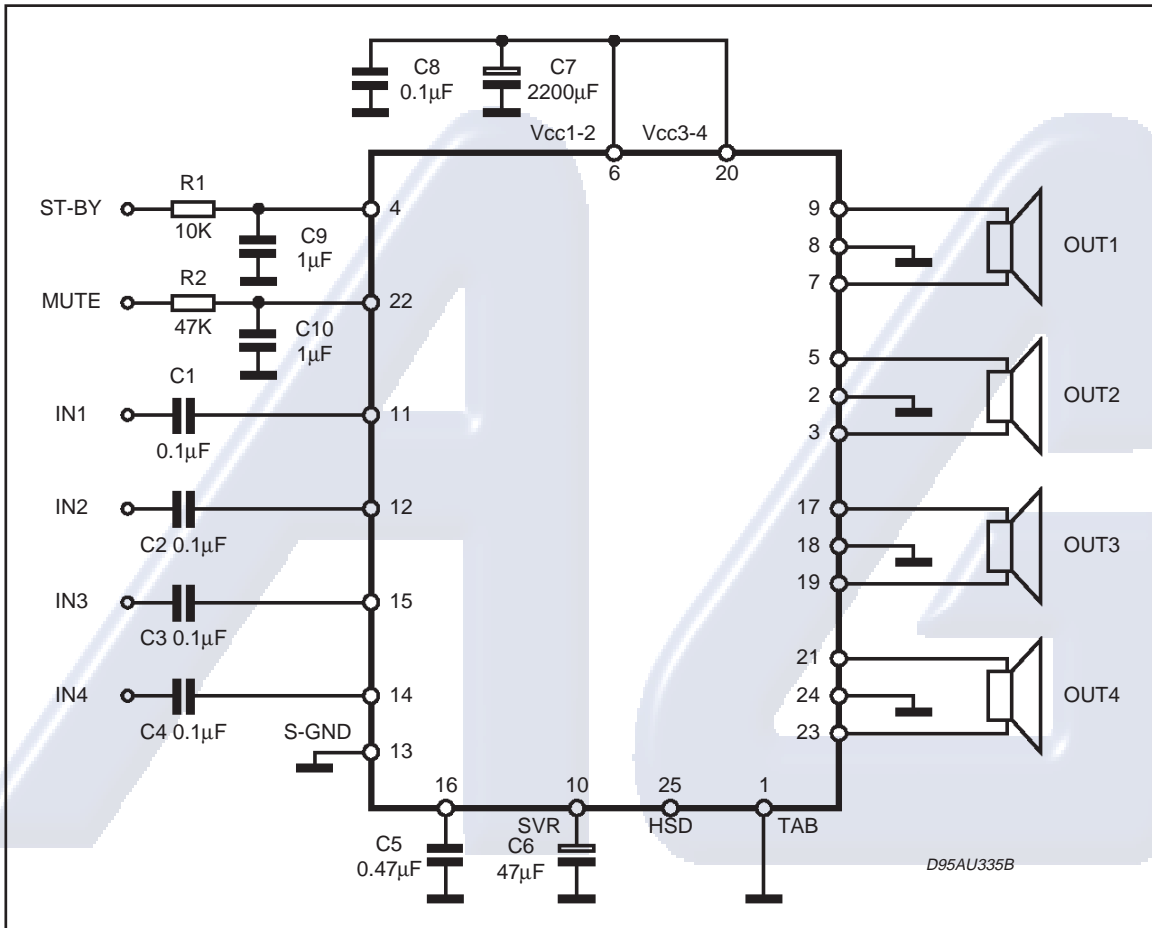
ELECTRICAL CHARACTERISTICS ($V_S = 14.4V$; $f = 1KHz$; $R_g = 600\Omega$; $R_L = 4\Omega$; $T_{amb} = 25^\circ C$;
Refer to the test and application diagram, unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{q1}	Quiescent Current	$R_L = \infty$		190	350	mA
V_{OS}	Output Offset Voltage	Play Mode			± 80	mV
dV_{OS}	During mute ON/OFF output offset voltage				± 80	mV
G_v	Voltage Gain		25	26	27	dB
dG_v	Channel Gain Unbalance				± 1	dB
P_o	Output Power	$V_S = 13.2V$; THD = 10% $V_S = 13.2V$; THD = 0.8% $V_S = 14.4V$; THD = 10%	22 16.5 26	24 18 28		W W W
$P_{o\ EIAJ}$	EIAJ Output Power (*)	$V_S = 13.7V$	37.5	40		W
$P_{o\ max.}$	Max. Output Power (*)	$V_S = 14.4V$	43	45		W
THD	Distortion	$P_o = 4W$		0.04	0.15	%
e_{No}	Output Noise	"A" Weighted Bw = 20Hz to 20KHz		50 70	70 100	μV μV
SVR	Supply Voltage Rejection	$f = 100Hz$; $V_r = 1V_{rms}$	50	75		dB
f_{ch}	High Cut-Off Frequency	$P_o = 0.5W$	80	200		KHz
R_i	Input Impedance		70	100		K Ω
C_T	Cross Talk	$f = 1KHz$ $P_o = 4W$ $f = 10KHz$ $P_o = 4W$	60	70 60	- -	dB dB
I_{SB}	St-By Current Consumption	$V_{St-By} = 1.5V$			100	μA
I_{pin4}	St-by pin Current	$V_{St-By} = 1.5V$ to $3.5V$			± 10	μA
$V_{SB\ out}$	St-By Out Threshold Voltage	(Amp: ON)	3.5			V
$V_{SB\ in}$	St-By in Threshold Voltage	(Amp: OFF)			1.5	V
A_M	Mute Attenuation	$P_{Oref} = 4W$	80	90		dB
$V_{M\ out}$	Mute Out Threshold Voltage	(Amp: Play)	3.5			V
$V_{M\ in}$	Mute In Threshold Voltage	(Amp: Mute)			1.5	V
$V_{AM\ in}$	V_S Automute Threshold	(Amp: Mute) Att $\geq 80dB$; $P_{Oref} = 4W$ (Amp: Play) Att $< 0.1dB$; $P_o = 0.5W$			6.5	V
I_{pin22}	Muting Pin Current	$V_{MUTE} = 1.5V$ (Sourced Current)	5	11	20	μA
		$V_{MUTE} = 3.5V$	-5		20	μA

(*) Saturated square wave output.

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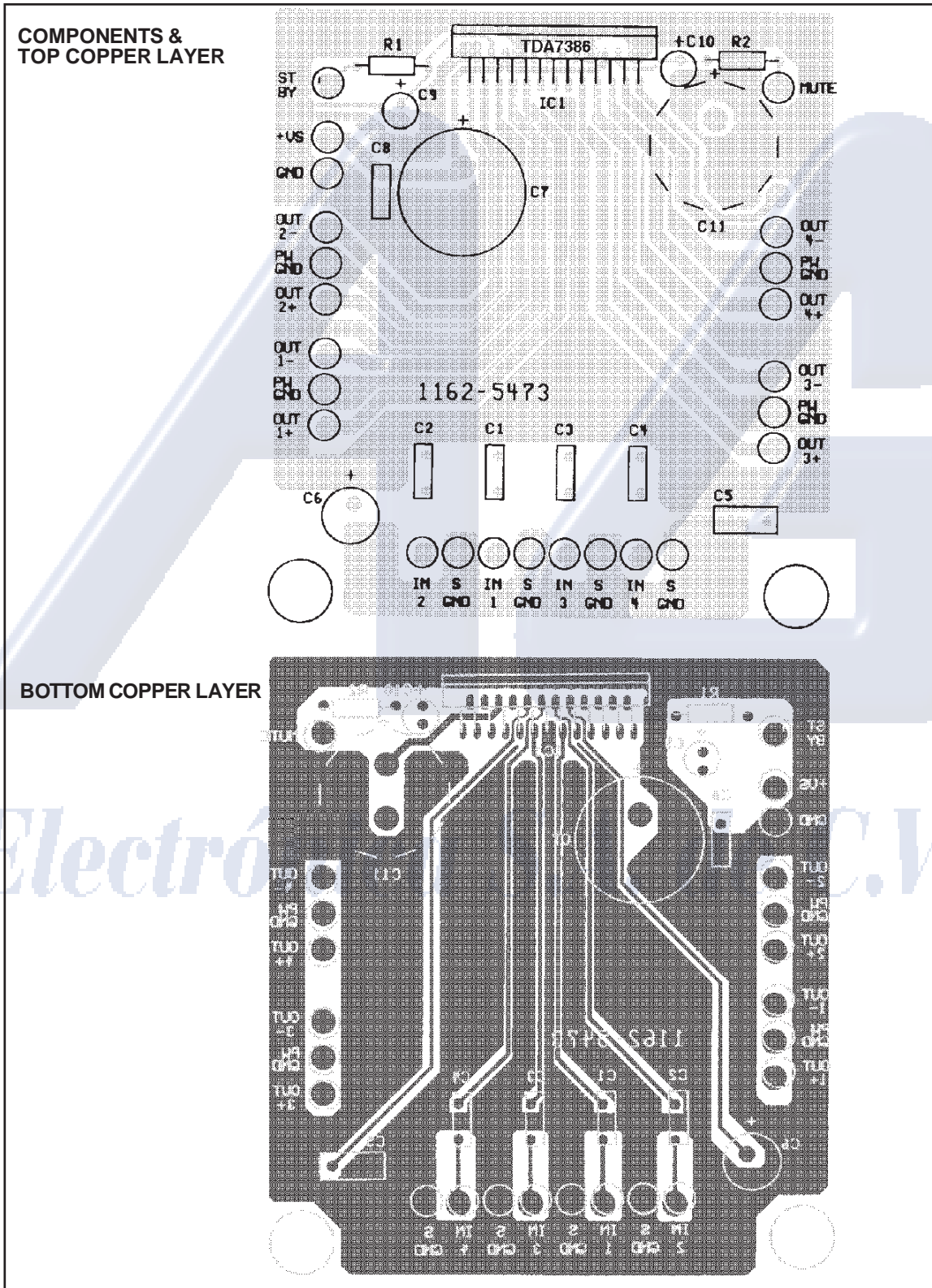
Figure 1: Standard Test and Application Circuit



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Figure 2: P.C.B. and component layout of the figure 1 (1:1 scale)



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Figure 3: Quiescent Current vs. Supply Voltage

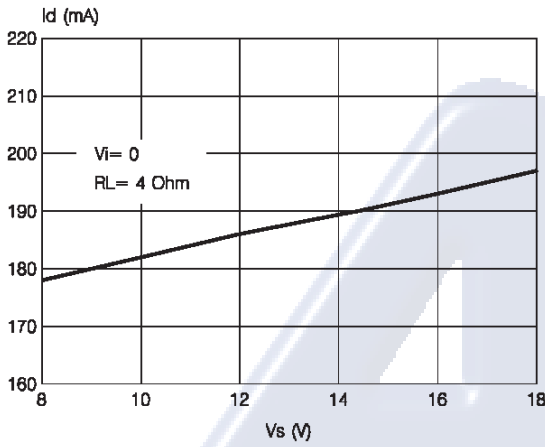


Figure 4: Quiescent Output Voltage vs. Supply Voltage

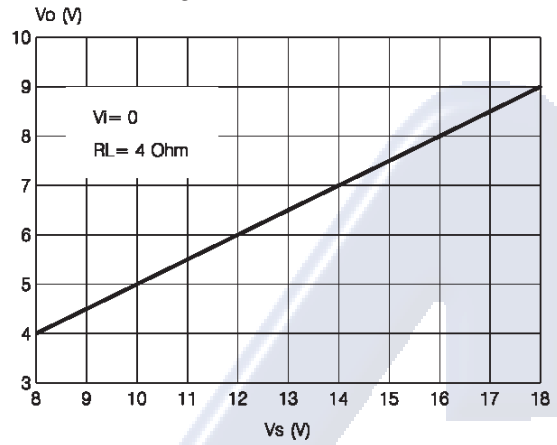


Figure 5: Output Power vs. Supply Voltage

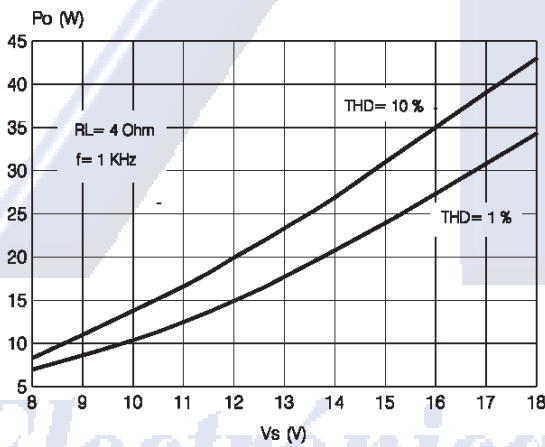


Figure 6: Maximum Output Power vs. Supply Voltage

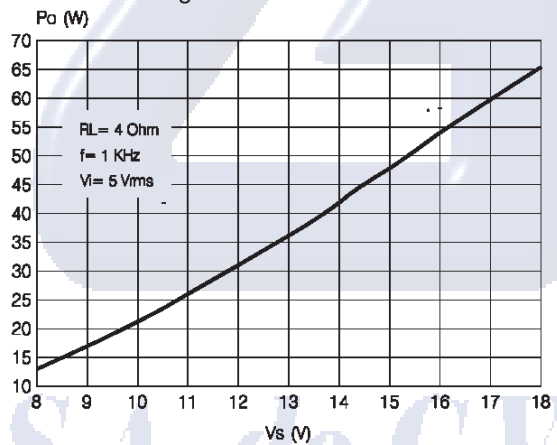


Figure 7: Distortion vs. Output Power

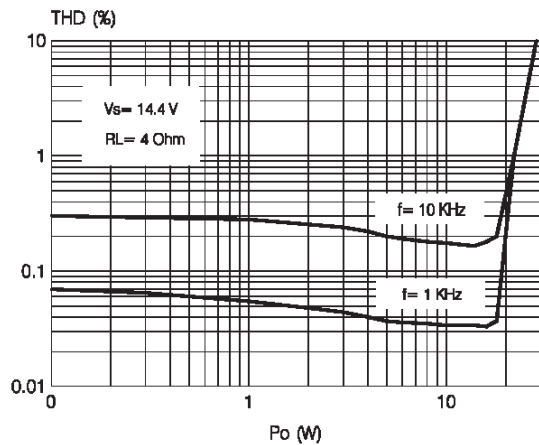


Figure 8: Distortion vs. Frequency

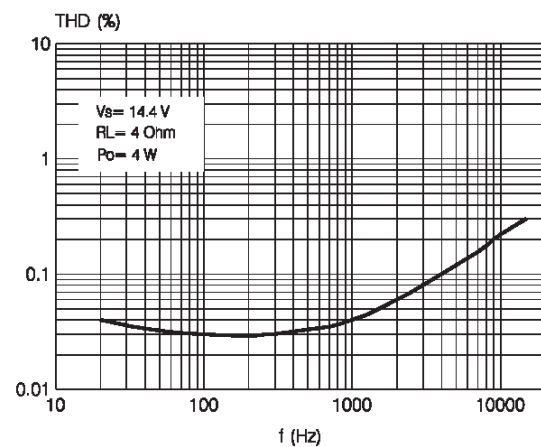


Figure 9: Supply Voltage Rejection vs. Frequency

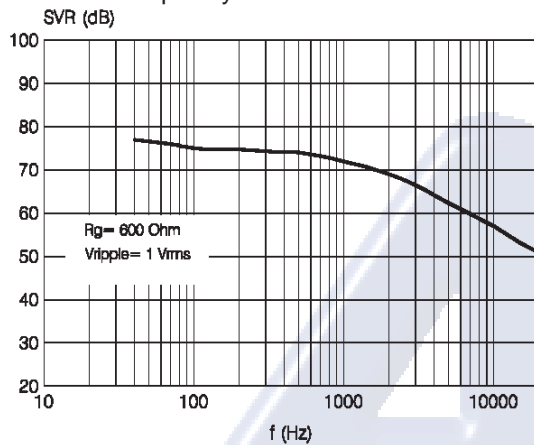


Figure 10: Crosstalk vs. Frequency

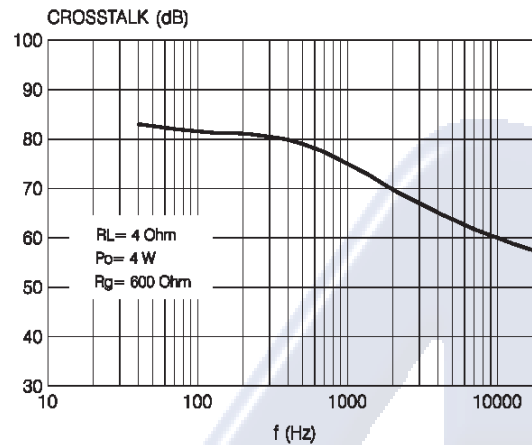


Figure 11: Output Noise vs. Source Resistance

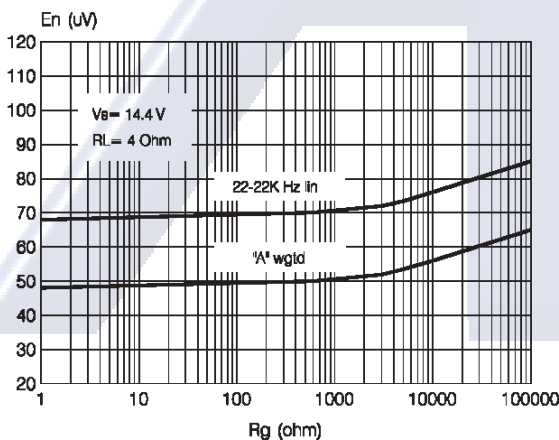
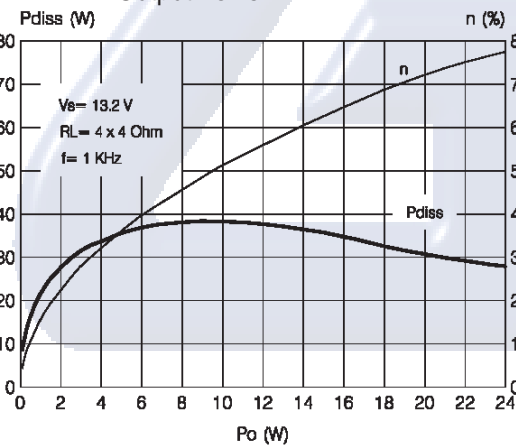


Figure 12: Power Dissipation & Efficiency vs. Output Power



APPLICATION HINTS (ref. to the circuit of fig. 1)

SVR

Besides its contribution to the ripple rejection, the SVR capacitor governs the turn ON/OFF time sequence and, consequently, plays an essential role in the pop optimization during ON/OFF transients. To conveniently serve both needs, **ITS MINIMUM RECOMMENDED VALUE IS 10µF.**

INPUT STAGE

The TDA7386's inputs are ground-compatible and can stand very high input signals ($\pm 8V_{pk}$) without any performances degradation.

If the standard value for the input capacitors (0.1µF) is adopted, the low frequency cut-off will amount to 16 Hz.

STAND-BY AND MUTING

STAND-BY and MUTING facilities are both

CMOS-COMPATIBLE. If unused, a straight connection to V_s of their respective pins would be admissible. Conventional/low-power transistors can be employed to drive muting and stand-by pins in absence of true CMOS ports or microprocessors.

R-C cells have always to be used in order to smooth down the transitions for preventing any audible transient noises.

Since a DC current of about 10 uA normally flows out of pin 22, the maximum allowable muting-series resistance (R_2) is 70KΩ, which is sufficiently high to permit a muting capacitor reasonably small (about 1µF).

If R_2 is higher than recommended, the involved risk will be that the voltage at pin 22 may rise to above the 1.5 V threshold voltage and the device will consequently fail to turn OFF when the mute line is brought down.

About the stand-by, the time constant to be assigned in order to obtain a virtually pop-free transition has to be slower than 2.5V/ms.

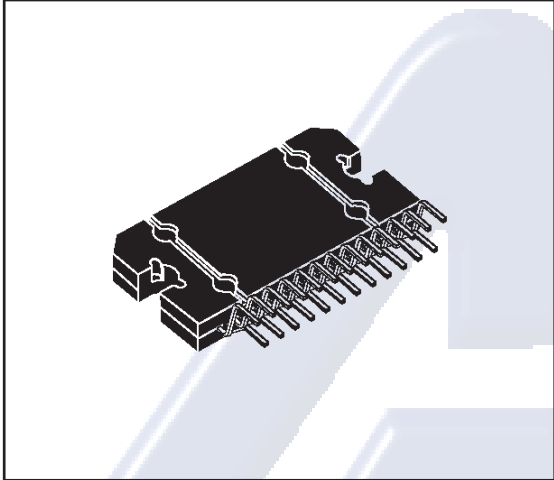


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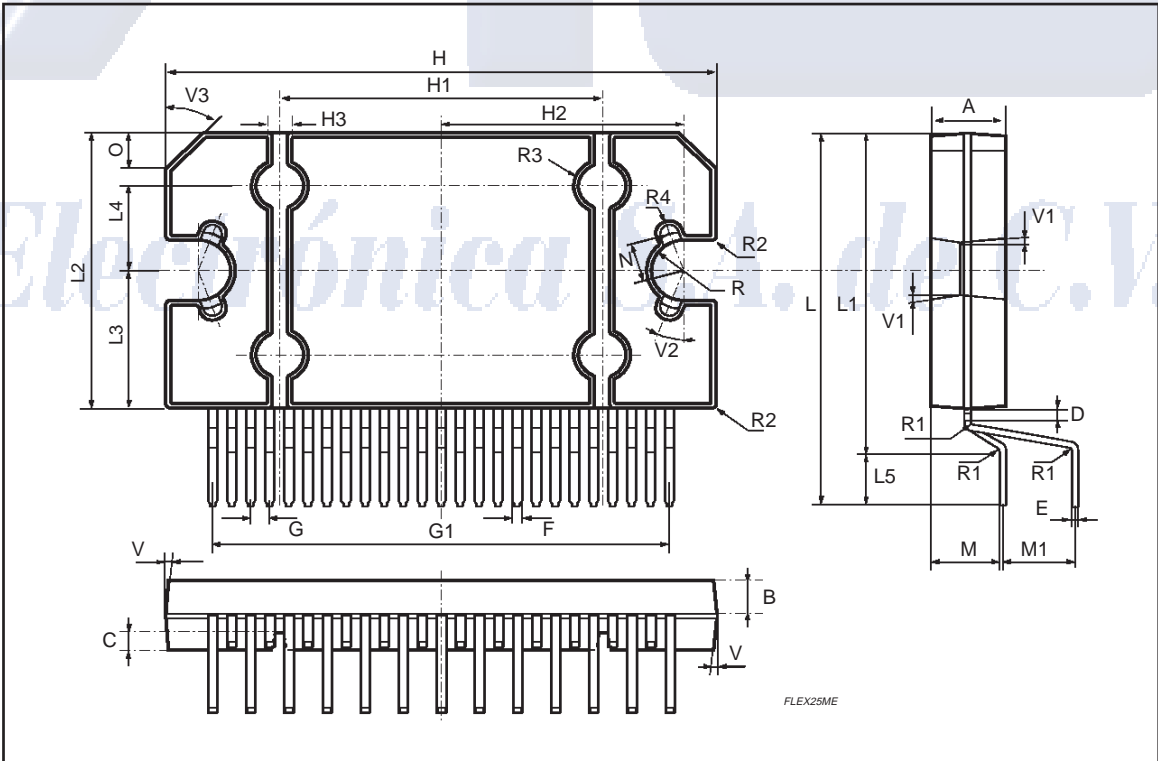
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H (2)	28.90	29.23	29.30	1.138	1.150	1.153
H1		17.00			0.669	
H2		12.80			0.503	
H3		0.80			0.031	
L (2)	22.07	22.47	22.87	0.869	0.884	0.904
L1	18.57	18.97	19.37	0.731	0.747	0.762
L2 (2)	15.50	15.70	15.90	0.610	0.618	0.626
L3	7.70	7.85	7.95	0.303	0.309	0.313
L4		5			0.197	
L5		3.5			0.138	
M	3.70	4.00	4.30	0.145	0.157	0.169
M1	3.60	4.00	4.40	0.142	0.157	0.173
N		2.20			0.086	
O		2			0.079	
R		1.70			0.067	
R1		0.5			0.02	
R2		0.3			0.12	
R3		1.25			0.049	
R4		0.50			0.019	
V					5° (Typ.)	
V1					3° (Typ.)	
V2					20° (Typ.)	
V3					45° (Typ.)	

(1): dam-bar protusion not included
(2): molding protusion included

OUTLINE AND MECHANICAL DATA



Flexiwatt25



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